

APPENDIX B

NOTATIONS

A	Area of filter through which seepage is passing, drainage area, radius of a circular group of wells; area of permeability test sample, area of entrance section of pipe in measuring flow through a venturi meter or with a Pitot tube, or area of stream of water at end of pipe in jet-flow measurement
AD	Cross-section area of sand drain
A_e	Equivalent radius of a group of wells
A_2	Area of orifice
a	Spacing of wells or wellpoints
B	Distance between two lines of wells, length of weir crest, or circumference of a vertical pipe in fountain flow calculations
b	Width of drainage slot, or end dimension of a rectangular drainage slot
b_1	Half width of rectangular array of wells
b_2	Half length of rectangular array of wells
C	Coefficient for friction loss in pipes; coefficient for empirical relation of D_{10} versus k ; coefficient for empirical relation of k versus R ; calibrated coefficient of discharge in measuring flow through a venturi meter or orifice; coefficient for measuring flow with a Pitot tube; or center of a circular group of wells
C_1, C_2	Coefficients for gravity flow to two slots from two-line sources
C_w	Weighted creep ratio for piping
$\bar{C}_x, \Delta c$	Factors for drawdown in the vicinity of a gravity well
c	Coefficient of runoff
D	Thickness of homogeneous isotropic aquifer, or inside diameter of a discharge pipe
\bar{D}	Thickness of equivalent homogeneous isotropic aquifer
D_{10}	Effective grain size
d	Thickness of a pervious stratum, or pressure tap diameter
d_1	Pipe diameter
d_2	Orifice diameter
\hat{d}	Transformed thickness of homogeneous, isotropic pervious stratum
E	Electrical potential difference or voltage
E_A	Extra-length factor
EAF	Effective area factor
F, F_p	Factor for computing drawdown at any point due to a group of wells with circular source of seepage, or freeboard
F', F'_p	Factor for computing drawdown at any point due to a group of wells with line source of seepage
F_B	Factor for computing drawdown midway between end wells of a line of wells with a circular source of seepage
F'_B	Factor for computing drawdown midway between end wells of a line of wells with a line source of seepage
FS	Factor of safety
F_c	Factor for computing drawdown at center of a group of wells with circular source of seepage
F'_c	Factor for computing drawdown at center of a group of wells with line source of seepage
F_m	Factor for computing drawdown at a well m in a two-line well array with a circular source of seepage
F_w	Factor for computing drawdown at a well in a group of wells with circular source of seepage
F'_w	Factor for computing drawdown at a well in a group of wells with line source of seepage
G	Correction factor for a partially penetrating well from Kozeny's formula or Muskat's formula
GWT	Groundwater table or level
g	Acceleration of gravity, 32.2 feet per second squared
H	Height of water table (initial) or piezometric surface, or crest height in fountain flow measurement; gravity head

- H' Drawdown or head differential, or residual drawdown after a pump test
- H'' Drawdown expressed as $H^2 - H_o^2$
- H_a Head dimension in the measurement of flow with a Parshall flume
- H_c Average head loss in header pipe to pump intake
- H_e Friction head loss in screen entrance or filter and screen entrance
- H_r Friction head loss in riser pipe and connections
- H_s Friction head loss in well screen
- H_v Velocity head loss in well
- H_w Total hydraulic head loss in well or wellpoint
- H_l Distance from bottom of sheet pile or cutoff wall to impervious boundary
- h Head at a specific point P, head on permeability test sample in constant head permeability test; final head on permeability test sample in falling head permeability test; pressure drop across an orifice; observed head on crest in weir flow measurement; or head at a specific time during a pump test
- h' Height of free discharge above water level in a gravity well
- H_c Head at center of a group of wells
- h_D Maximum head landward from a drainage slot or line of wells, or maximum head between two slots or lines of wells
- h_e Head in an artesian drainage slot, average head at a line of wells, or height of bottom of excavation in computing the creep ratio
- h_m Head midway between wells, or height of mercury for pipe orifice flow measurement
- h_o Head in a gravity drainage slot or at equivalent drainage slot simulating a line of wellpoints or sand drains, or initial head on permeability test sample in the falling head permeability test
- h_p Head at point P
- h_s Height of free discharge above water level in drainage slot
- h_v Velocity head in measuring flow with a Pitot tube
- h_w Head at well, wellpoint, or sand drain
- h_{ws} Wetted screen length
- h_{w(p)} Head in a wellpoint that can be produced by the vacuum of a wellpoint pump
- I Electric current or rate of flow
- i Hydraulic gradient of seepage, well number, intensity of rainfall
- i_e Electrical gradient between electrodes
- j Drawdown at any well
- K Constant used in jet-flow calculations
- k Coefficient of permeability of homogeneous isotropic aquifer
- \bar{k} Transformed coefficient of permeability
- k_a Coefficient of permeability for the flow of air
- k_D Vertical coefficient of permeability of a sand drain
- k_e Coefficient of electroosmotic permeability
- \bar{k}_e Effective permeability of transformed aquifer
- k_h Horizontal coefficient of permeability
- k_v Vertical coefficient of permeability
- L Distance from drainage slot, well, or line of wells or wellpoints to the effective source of seepage, length of permeability test sample, or seepage length through which Ah acts in determining a seepage gradient
- L_G Distance from drainage slot to change from artesian to gravity flow
- L_J Distance from well j to source of seepage
- ℓ Half the distance between two parallel drainage slots or lines of wells; long dimension of a rectangular drainage slot, or number of strata penetrated by a well in calculating effective well screen penetration
- \bar{W}
- M Height of pump intake above base of aquifer
- MSL Mean sea level
- N_e Number of equipotential drops in a flow net
- N_f Number of flow channels in a flow net
- n Number of wells in system or group, or porosity, number of strata in an aquifer for transformed section calculations, or number of concentric rings in measuring flow with a Pitot tube
- n_e Number of equipotential drops from seepage exit to point P

- P Point at which head is computed, or factor for **drawdown** in the vicinity of a gravity well
- \bar{p} Mean absolute pressure inflow system
- p_1 Absolute atmospheric pressure
- p_2 Absolute air pressure at line of vacuum wells
- Q Rate of flow to a fully penetrating drainage slot per unit length of slot, capacity, or rate of pumping, or rate of surface water runoff
- Q_a Rate of flow of air
- Q_{e-vp} Rated capacity of vacuum pump at atmospheric pressure
- Q_D Rate of flow to a sand dram
- Q_e Flow to well in an electroosmotic drainage system
- Q_P Total surface water pump capacity
- Q_p Rate of flow to a partially penetrating drainage slot per unit length of slot
- $Q_p(T)$ Total flow to a wellpoint system
- Q_T Total flow to a dewatering system
- Q_w Flow to a well or wellpoint
- Q'_w Flow to an observation well
- Q_{wi} Flow to well i
- Q_{wj} Flow to well j
- Q_{wp} Flow to a partially penetrating artesian well
- q Rate of flow, or flow per unit length of section flow net
- q_c Limiting flow into a filter or well screen
- R Radius of influence of well, rainfall for assumed storm, or ratio of entrance to throat diameter in measuring flow through a venturi meter
- \bar{R} Distance from well to change from artesian to gravity flow
- R_i Radius of influence of well i
- R_j Radius of influence of well j
- r Distance from well to point P, or distance from a test well to an observation piezometer
- r' Distance from image well to point P
- r_i Distance from well i to point P
- r_{ij} Distance from well i to well j
- r_w Radius (effective) of a well
- r_{wj} Radius (effective) of well j
- S Coefficient of storage, the volume of water an aquifer will release from (or take into) storage per unit of surface area per unit change in head. (For **artesian** aquifers, S is equal to the water forced from storage by compression of a column of the aquifer by the additional load created by lowering the artesian pressure in the aquifer by pumping or drainage. For **gravity flow** aquifers, S is equal to the specific yield of the material being dewatered plus the water forced from the saturated portion of the aquifer by the increased surcharge caused by lowering the groundwater table.)
- S' Extrapolated S value used in computations for nonequilibrium gravity flow
- S_i Distance from point P to image well i
- S_{ij} Distance from image well i to well j
- S_y Specific yield of aquifer (volume of water that can be drained by gravity from a saturated unit volume of material)
- s Height of bottom of well above bottom of aquifer
- T Duration of rainfall, coefficient of transmissibility in square feet per minute (the coefficient of permeability k multiplied by the aquifer thickness D), or thickness of less pervious strata overlying a more pervious stratum
- T' Coefficient of transmissibility in gallons per day per foot width
- t Depth of water in well, or elapsed pumping time
- \bar{t} Time for cone of **drawdown** to reach an impermeable boundary or a source of seepage
- t' Elapsed pumping time since pump started
- t'' Elapsed time since pump stopped
- t_0 Time at zero **drawdown** or at start of pump test
- u Argument of W(u), a well function
- V Volume of water in permeability test, volume of sample in specific yield test, velocity, or vacuum at pump intake

∇	Volume of sump storage
V_R	Volume of surface water runoff
v	Velocity at center of concentric rings of equal area in measuring flow with a Pitot tube
V_y	Volume of water drained in specific yield test
W	Penetration of a drainage well, slot, or cutoff wall in a homogeneous isotropic aquifer, penetration of a drainage well or slot required to obtain an effective penetration of \bar{W} in a stratified aquifer, distance between water table in a cofferdammed area and base of the sheet piling or cutoff wall, or size of flume in the measurement of flow with a Parshall flume
W	Effective depth of penetration of a drainage slot or well into aquifer
$W(u)$	Exponential integral termed a "well function"
w_l	Actual well penetration in strata l in calculating effective well-screen penetration \bar{W}
x	Length of a drainage slot, distance from center line of excavation to sheet pile or cutoff wall, or distance along axis of a discharge pipe to a point in the stream in jet-flow measurement
y	Distance from drainage slot to a specific line, actual vertical dimension in an anisotropic stratum, or distance perpendicular to the axis of a discharge pipe to a point in the stream in jet-flow measurement
\bar{y}	Transformed vertical dimension in an anisotropic stratum
z	Depth of soil stabilized by electroosmosis, or height of crest above bottom of approach channel in weir-flow measurement
Γ	Gamma function for determining G
γ_w	Unit weight of water
Δh	Change in piezometric head for a particular seepage length; drawdown; artesian head above bottom of slope or excavation
Δh_D	Maximum head landward from a line of wells above head at wells
Δh_m	Head midway between wells above that at a well
Δh_w	Drawdown at well in a line of wells below head h_e at an equivalent drainage slot
$\Delta H'$	Change in drawdown during pump test between two different pumping rates
Δp	Pressure differential
Δs	Drawdown in feet per cycle of (log) time-drawdown curve in pump test
$\Delta s'$	Residual drawdown in feet per cycle of (log) t'/t''
γ_m	Submerged unit weight of soil
θ_a	Uplift factor for artesian wells or wellpoints
θ_m	Midpoint uplift factor for artesian wells or wellpoints
λ	Extra-length coefficient for flow to a partially penetrating drainage slot
μ_a	Absolute viscosity of air
μ_w	Absolute viscosity of water
ρ	Specific resistance of electrolyte
$\$$	Geometric shape factor (dimensionless)